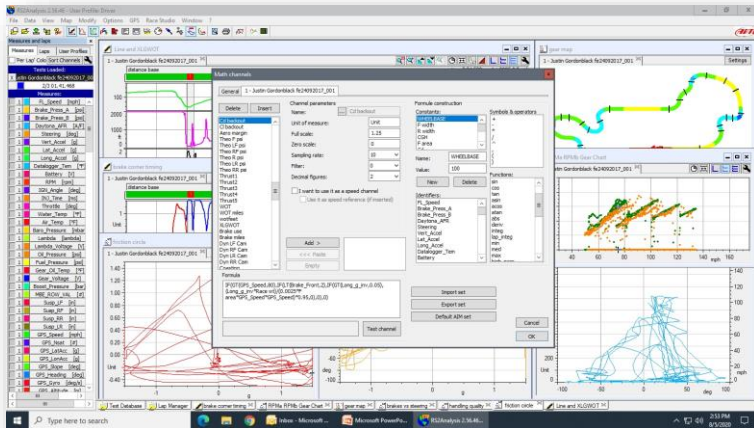




Co-Host:
John Block
www.auto-ware.com

Webinar Series

Bringing Data Support and Training to You

Profiles and Math Channels

In Race Studio 2 Analysis Make You Faster

2020 Webinar #39

August 11th, 2020

www.aimsports.com



YouTube

1.800.718.9090

John Block

john@auto-ware.com

www.auto-ware.com



Co-Host: John Block



- Involved in Motorsports for 50 years, as a Driver, Designer, Fabricator, Engineer, DAG, Driver Coach, Webinar Instructor
- Indy Cars, ARCA, NASCAR, Indy Lights, Trans AM, SCCA, USF2000, Sprint Cars, Modifieds, Etc



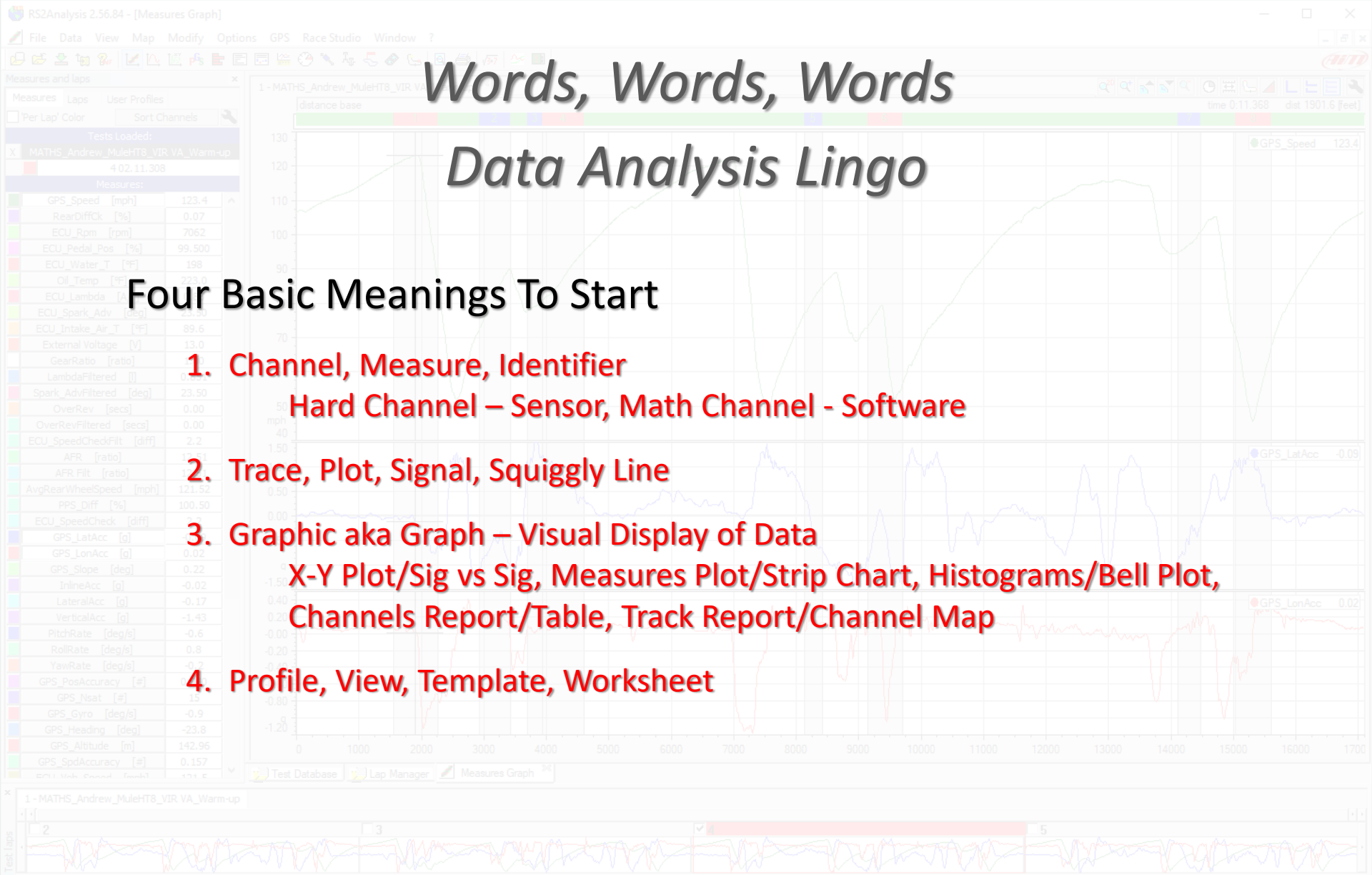
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Words, Words, Words Data Analysis Lingo

Four Basic Meanings To Start

1. Channel, Measure, Identifier

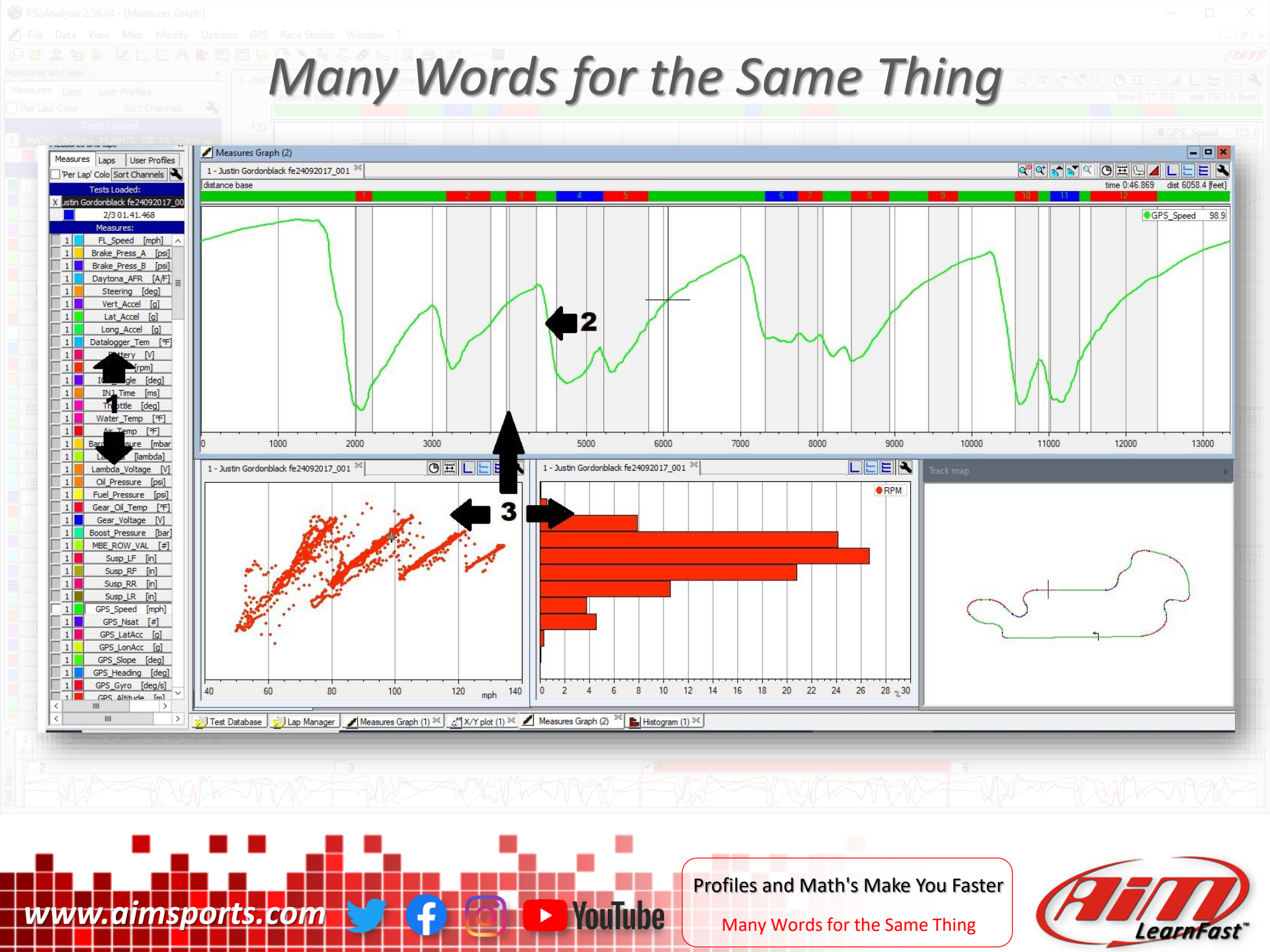
Hard Channel – Sensor, Math Channel - Software

2. Trace, Plot, Signal, Squiggly Line

3. Graphic aka Graph – Visual Display of Data

X-Y Plot/Sig vs Sig, Measures Plot/Strip Chart, Histograms/Bell Plot, Channels Report/Table, Track Report/Channel Map

4. Profile, View, Template, Worksheet



Measures and Laps

Measures Laps User Profiles

Per Lap Color Sort Channels

Tests Loaded:

MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

4 02.11.308

Measures:

GPS_Speed [mph] 123.4

RearDiffCk [%] 0.07

ECU_Rpm [rpm] 7062

ECU_Pedal_Pos [%] 99.500

ECU_Water_T [°F] 198

Oil_Temp [°F] 223.0

ECU_Lambda [A/F] 0.85

ECU_Spark_Adv [deg] 23.50

ECU_Intake_Air_T [°F] 89.6

External_Voltage [V] 13.0

GearRatio [ratio] 1.00

LambdaFiltered [] 0.851

Spark_AdvFiltered [deg] 23.50

OverRev [secs] 0.00

OverRevFiltered [secs] 0.00

ECU_SpeedCheckFilt [diff] 2.2

AFR [ratio] 12.51

AFR_Filt [ratio] 12.51

AvgRearWheelSpeed [mph] 121.52

RPS_Diff [%] 100.50

ECU_SpeedCheck [diff] 2.2

GPS_LatAcc [g] -0.09

GPS_LonAcc [g] 0.02

GPS_Slope [deg] 0.22

InlineAcc [g] -0.02

LateralAcc [g] -0.17

VerticalAcc [g] -1.43

PitchRate [deg/s] -0.6

RollRate [deg/s] 0.8

YawRate [deg/s] -0.2

GPS_PosAccuracy [°] 0.940

GPS_Heading [deg] 15

GPS_Gyro [deg/s] -0.9

GPS_Heading [deg] -23.8

GPS_Altitude [m] 142.96

GPS_SpdAccuracy [°] 0.157

GPS_Heading [deg] 171.1

GPS_Heading [deg] 171.1

GPS_Heading [deg] 171.1

GPS_Heading [deg] 171.1

GPS_Heading [deg] 171.1

GPS_Heading [deg] 171.1

GPS_Heading [deg] 171.1

GPS_Heading [deg] 171.1

GPS_Heading [deg] 171.1

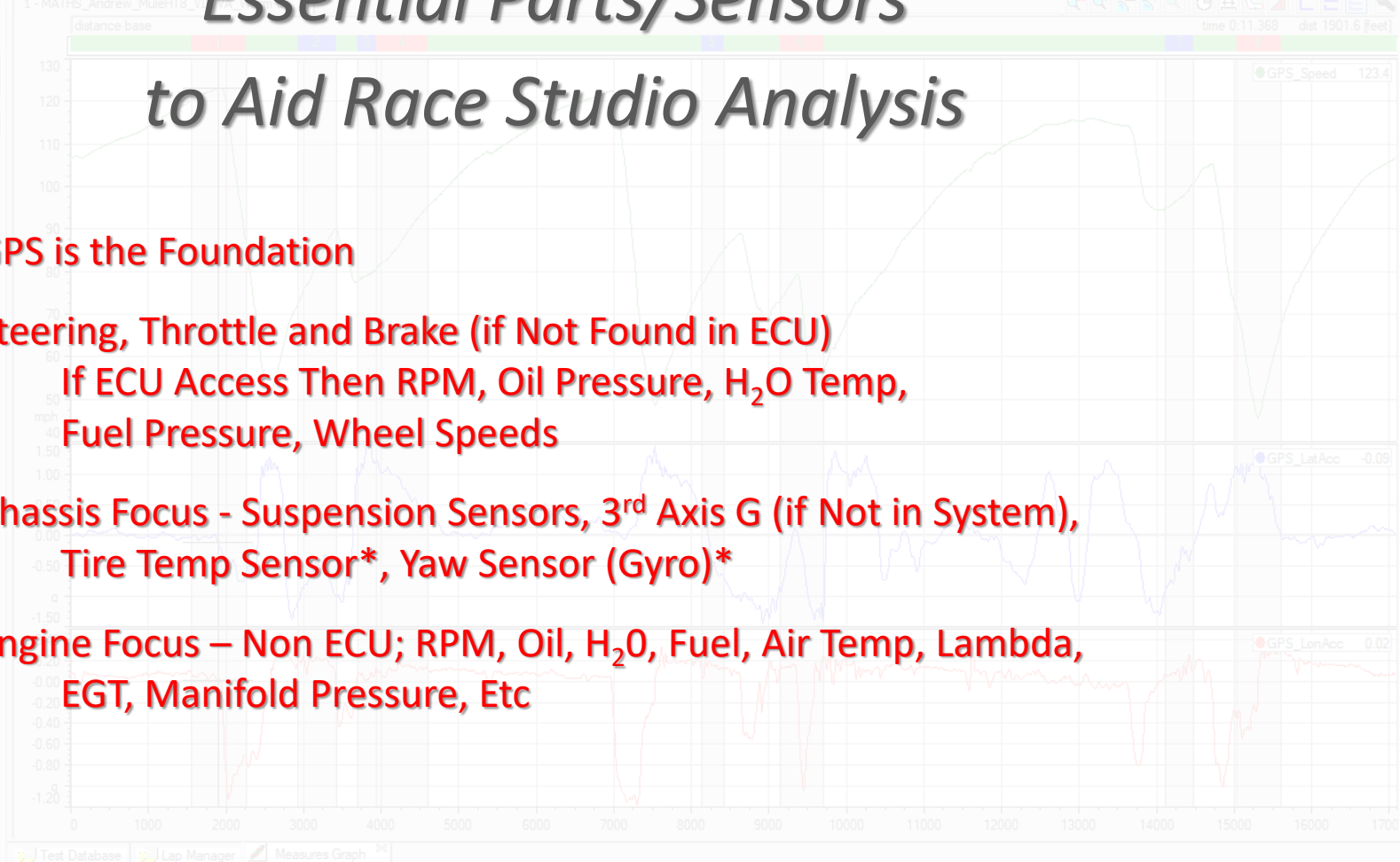
Essential Parts/Sensors to Aid Race Studio Analysis

■ GPS is the Foundation

■ Steering, Throttle and Brake (if Not Found in ECU)
If ECU Access Then RPM, Oil Pressure, H₂O Temp,
Fuel Pressure, Wheel Speeds

■ Chassis Focus - Suspension Sensors, 3rd Axis G (if Not in System),
Tire Temp Sensor*, Yaw Sensor (Gyro)*

■ Engine Focus – Non ECU; RPM, Oil, H₂O, Fuel, Air Temp, Lambda,
EGT, Manifold Pressure, Etc





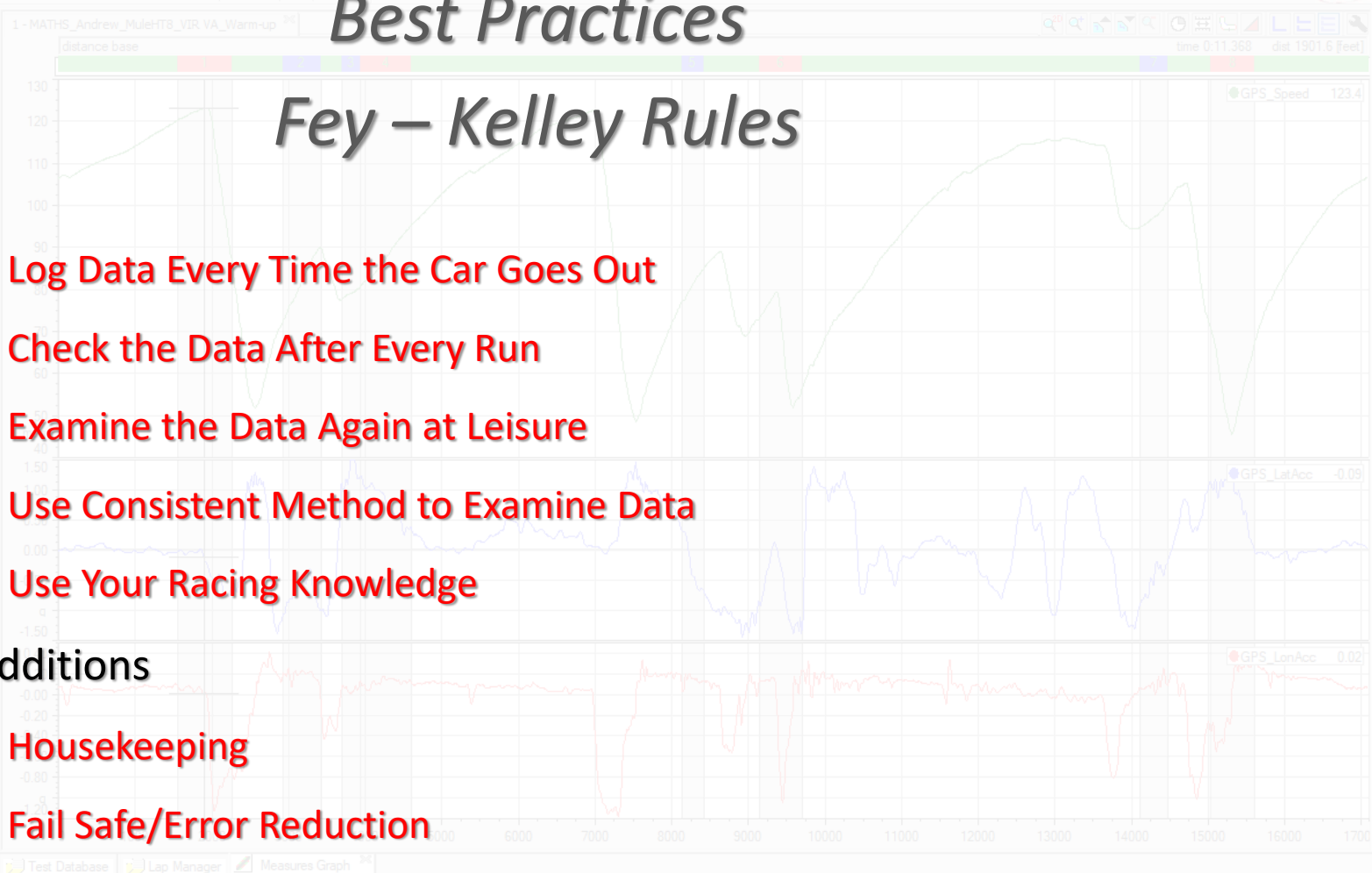
Best Practices

Fey – Kelley Rules

- Log Data Every Time the Car Goes Out
- Check the Data After Every Run
- Examine the Data Again at Leisure
- Use Consistent Method to Examine Data
- Use Your Racing Knowledge

JB's Additions

- Housekeeping
- Fail Safe/Error Reduction
- Think in Reverse



Profiles for Consistent Method to Review Data

RS2Analysis 2.56.46 - User Profile: JB's Quick check

File Data View Map Modify Options GPS Race Studio Window ?

Measures and laps

Current User Profile

JB's Quick check

Available User Profiles

- [Ctrl+1] JB's Quick check
- [Ctrl+2] Driver
- [Ctrl+3] Seg times Consistency
- [Ctrl+4] line speed
- [Ctrl+5] compare
- [Ctrl+6] Coasting Traction etc
- [Ctrl+7] Engine
- [Ctrl+8] Gearing
- [Ctrl+9] Braking
- Handling
- Transient
- Platform
- Shocks
- Aero
- LifeCycle
- Statics
- scratchpad
- scratch 2

Engine QC

1 - Justin Gordonblack fe24092017_001

Num	Lap	Time	Dist	Oil_Pressure		RPM		Water_Temp		Battery		Add / Remove
				min	max	min	max	min	max	min	max	
run 2 / lap 3	01.41.468	13356		41	6902	193	14.3	14.9				
run 2 / lap 4	01.43.631	13378		33	6609	193	14.5	15.1				
run 2 / lap 5	01.43.836	13415		29	6512	195	14.5	15.2				
run 2 / lap 8	01.42.463	13402		32	6898	195	14.8	15.2				
run 3 / lap 2	01.42.900	13400		33	6410	194	14.6	15.1				
run 3 / lap 3	01.43.108	13419		35	7012	198	14.8	15.0				

1 - Justin Gordonblack fe24092017_001

Num	Lap	Time	Dist	LF lbs		RF lbs		LR lbs		RR lbs		Add / Remove
				min	max	min	max	min	max	min	max	
run 2 / lap 3	01.41.468	13356		78.44	-297.44	144.32	47.17					
run 2 / lap 4	01.43.631	13378		79.19	-289.13	147.37	62.27					
run 2 / lap 5	01.43.836	13415		77.68	178.57	169.75	52.20					
run 2 / lap 8	01.42.463	13402		78.44	143.82	165.68	76.36					
run 3 / lap 2	01.42.900	13400		78.44	143.06	150.42	59.25					
run 3 / lap 3	01.43.108	13419		76.93	137.02	147.37	81.39					

Test Database Lap Manager Engine QC Chassis QC

Profiles for Consistent Method to Review Data

Measures and laps

Measures Laps User Profiles

Per Lap Color Sort Channels

Tests Loaded:

MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

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ECU_Water_T [°F] 198

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ECU_Spark_Adv [deg] 23.50

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RS2Analysis 2.56.46 - User Profile: JB's Quick check

File Data View Map Modify Options GPS Race Studio Window

Measures and laps

Measures Laps User Profiles

Current User Profile

JB's Quick check

Available User Profiles

[Ctrl+1] JB's Quick check	☐	☐	☐
[Ctrl+2] Driver	☐	☐	☐
[Ctrl+3] Seg times Consistency	☐	☐	☐
[Ctrl+4] line speed	☐	☐	☐
[Ctrl+5] compare	☐	☐	☐
[Ctrl+6] Coasting Traction etc	☐	☐	☐
[Ctrl+7] Engine	☐	☐	☐
[Ctrl+8] Gearing	☐	☐	☐
[Ctrl+9] Braking	☐	☐	☐
Handling	☐	☐	☐
Transient	☐	☐	☐
Platform	☐	☐	☐
Shocks	☐	☐	☐
Aero	☐	☐	☐
LifeCycle	☐	☐	☐
Stastics	☐	☐	☐
scratchpad	☐	☐	☐
scratch 2	☐	☐	☐

Engine QC

1 - Justin Gordonblack fe24

Num	Lap
run 2 / lap 3	01.
run 2 / lap 4	01
run 2 / lap 5	01
run 2 / lap 8	01
run 3 / lap 2	01
run 3 / lap 3	01

1 - Justin Gordonblack fe24

Num	Lap
5	

Profiles for Consistent Method to Review Data

RS2Analysis 2.56.46 - User Profile: JB's Quick check

File Data View Map Modify Options GPS RaceStudio Window ?

Measures and laps

Current User Profile

JB's Quick check

Available User Profiles

- [Ctrl+1] JB's Quick check
- [Ctrl+2] Driver
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- [Ctrl+8] Gearing
- [Ctrl+9] Braking
- Handling
- Transient
- Platform
- Shocks
- Aero
- LifeCycle
- Statics
- scratchpad
- scratch 2

Engine QC

1 - Justin Gordonblack fe24092017_001

Num	Lap	Time	Dist	Oil_Pressure		RPM		Water_Temp		Battery		Add / Remove
				min	max	min	max	min	max	min	max	
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run 2 / lap 4	01.43.631	13378		33	6609	193	14.5	15.1				
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run 2 / lap 8	01.42.463	13402		32	6898	195	14.8	15.2				
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1 - Justin Gordonblack fe24092017_001

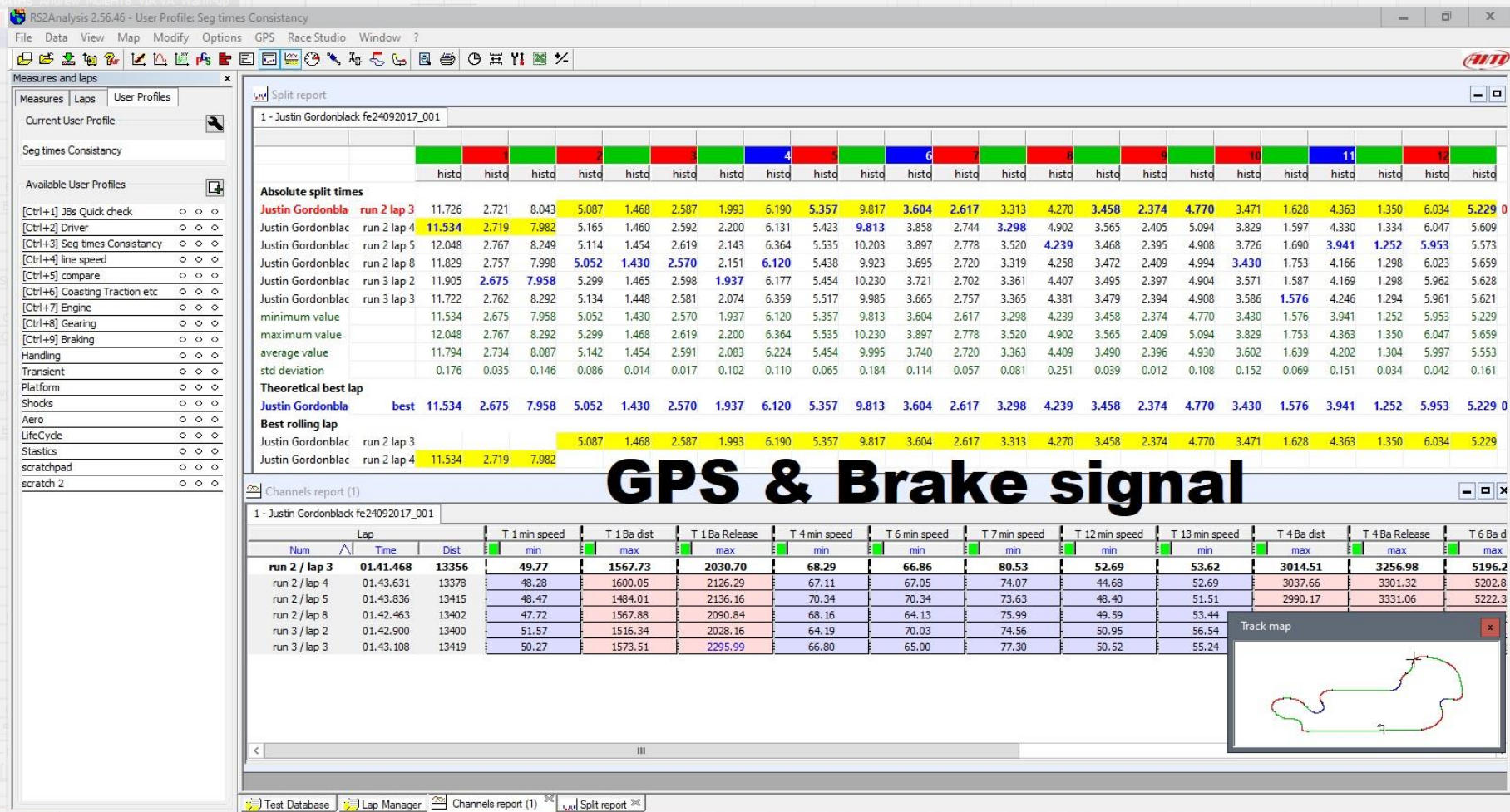
Num	Lap	Time	Dist	LF lbs		RF lbs		LR lbs		RR lbs		Add / Remove
				min	max	min	max	min	max	min	max	
run 2 / lap 3	01.41.468	13356		78.44	-297.44	144.32	47.17					
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run 2 / lap 5	01.43.836	13415		77.68	178.57	169.75	52.20					
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run 3 / lap 2	01.42.900	13400		78.44	143.06	150.42	59.25					
run 3 / lap 3	01.43.108	13419		76.93	137.02	147.37	81.39					

Test Database Lap Manager Engine QC Chassis QC

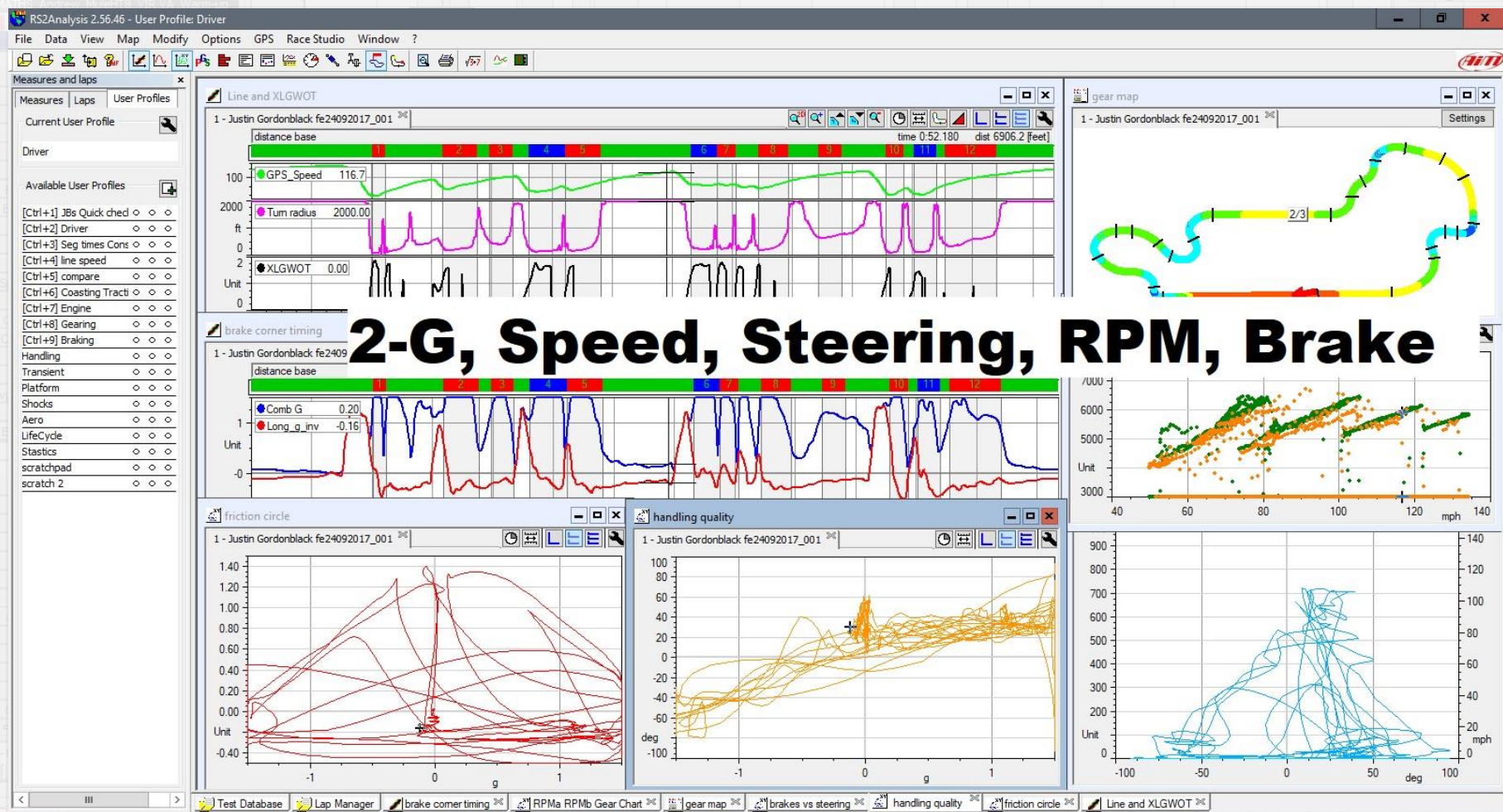
Profiles for Consistent Method to Review Data



Profiles for Consistent Method to Review Data

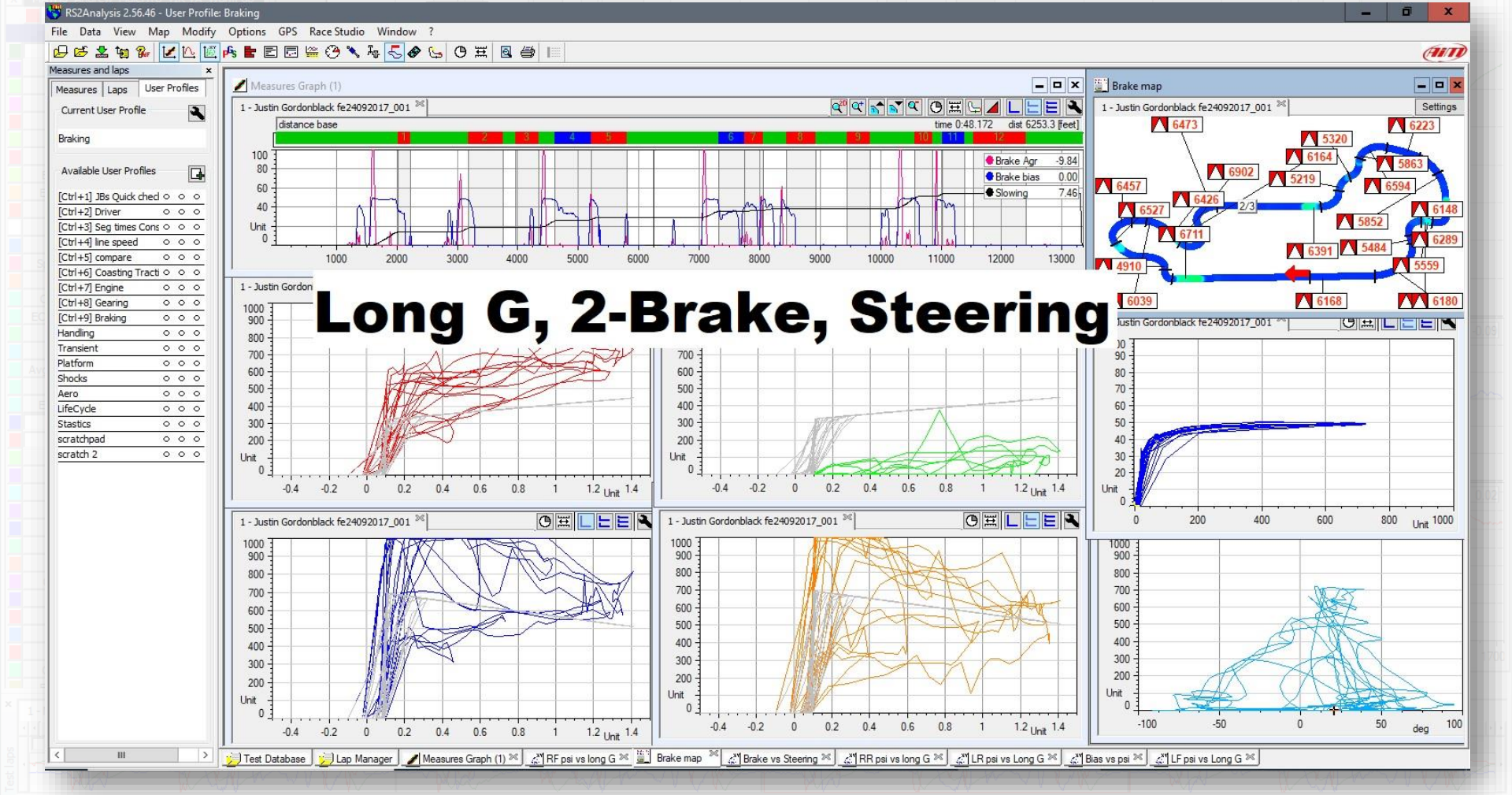


Profiles for Consistent Method to Review Data



Profiles for Consistent Method to Review Data

The background image shows the RS2Analysis 2.56.84 software interface. The title bar reads 'RS2Analysis 2.56.84 - [Measures Graph]'. The menu bar includes 'File', 'Data', 'View', 'Map', 'Modify', 'Options', 'GPS', 'RaceStudio', and 'Window'. The toolbar contains various icons for file operations, data management, and visualization. The main window displays a 'Measures and laps' graph with a horizontal bar chart showing different colored segments (green, red, blue, yellow) representing different measures or laps. The status bar at the bottom right shows 'GPS Speed 123.4'.



Profiles for Consistent Method to Review Data

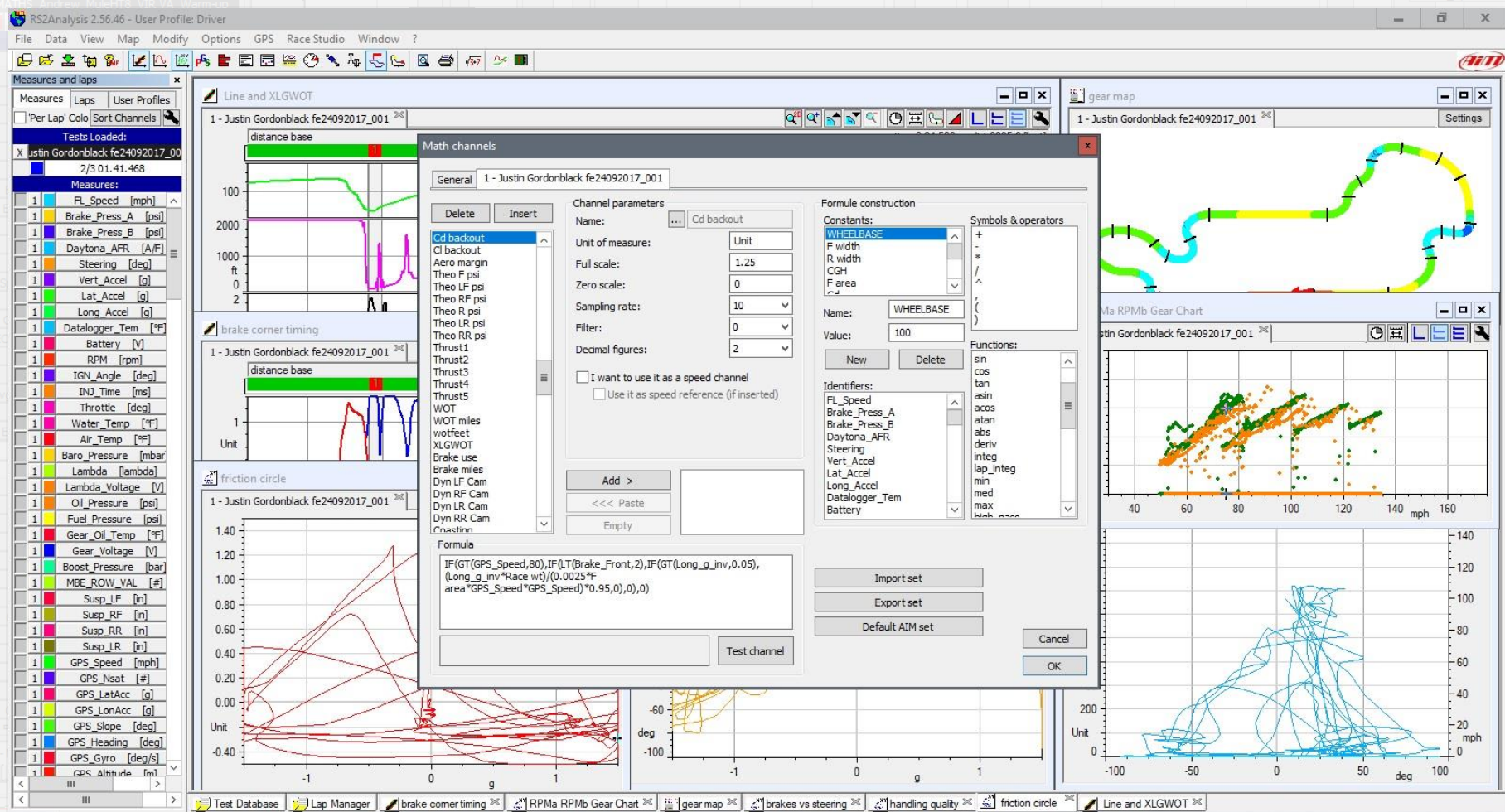
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Profiles for Consistent Method to Review Data



Ultimate Weapon – Math Channels



Constants on Car

JB's universal constants for math channels

BASIC CONFIGURATION	VALUE	BRAKES	VALUE
Wheelbase (in)		F Rotor radius (in)	
F width (in)		R Rotor radius (in)	
R width (in)			
		F pad Cf	
		R pad Cf	
AERO			
F area (sq ft)		F caliper piston dia (in)	
Cd		R caliper piston dia (in)	
SET UP (inches & lbs)		Number of pistons F caliper	
Nose L static		Number of pistons R caliper	
Nose R static			
LF ride height		CGH (in)	
RF ride height			
Rear ride height		Tire Cf	
LF weight		LF spring	
RF weight		RF spring	
LR weight		LR spring	
RR weight		RR spring	
TIRES		LF motion ratio	
Tire roll out (in)		RF motion ratio	
Roll radius (in)		LR motion ratio	
		RR motion ratio	

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- Pre-Calculated Gear Position Function
- Configuring WiFi Communication
- Customizing AiM Device Logos
- Race Studio 3 Basic Configuration - Part 1
- Race Studio 3 Basic Configuration - Part 2
- **I Have Downloaded my Data, Now What - Part 1*
- **I Have Downloaded my Data, Now What - Part 2*
- GPS Lap Insert
- Data Views
- Measure Units
- Sort Channels
- Test Properties
- Per Lap Color
- Export Tests
- Channel Reports
- Setting Time
- Track Mapping
- Selection Criteria
- Sensor Calibration
- Conditional Alarms
- Gear Position
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Additional Materials

LearnFast™ E-Training Video



RS2Analysis 2.56.84 - [Measures Graph]

File Data View Map Modify Options GPS RaceStudio Window ?

Measures and Laps

Measures Laps User Profiles

Per Lap Color Sort Channels

Tests Loaded:

MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

130

4 02:11.3

Measures:

GPS_Speed [km/h]		
RearDiffCk [rpm]	7062	100
ECU_Rpm [rpm]	99.500	
ECU_Pedal_Pos [%]		
ECU_Water_T [°F]		
Oil_Temp [°F]	0.85	
ECU_Lambda [A/F]		
ECU_Spark_Adv [deg]		
ECU_Intake_Air_T [°F]		
External_Voltage [V]	13.0	
GearRatio [ratio]	1.00	
LambdaFiltered []	0.851	60
Spark_AdvFiltered [deg]	23.50	

1 - MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

distance base

time 0:11.368 dist 1301.6 feet

123.4

Customer Support

AiM Sports technical support staff regularly attend races and other events

Call us at 1-800-718-9090 and Look for us at a track near you!



A black AiM service van parked next to a large black banner that reads 'THE RUMBLE' with a car icon.



A technician wearing an AiM 'Racing Data Power' shirt works on the engine of a blue race car. The car features an AiM logo and an OMP sticker.



A man stands in front of an AiM booth at a race event. The booth includes a red canopy with the AiM logo and website, two red AiM flagpoles, and a service van in the background.

www.aimsports.com

 YouTube

Customer Support

At an Event Near You!



With Education, Imagination Is Your Only Limit In Race Studio Analysis

To Learn More Beginner to Intermediate Data Analysis Or Advanced Professional Data Analysis Go to the Auto-Ware Website or contact John Block Directly at:

http://www.auto-ware.com/webinar_home.html
john@auto-ware.com or (505)-890-8708

Next Round of Webinars Start: Monday, August 17th

- Start Time 8pm Eastern / 5pm Pacific
- All 5 Sessions for Only \$175!
- Handouts and Links to Recordings Included
- Limited to Only 8 Attendees per Session
- Highly Interactive with Even More Features

Remember: *Race the Track
Not the Other Cars
Be Safe and Have Fun!*

The Original Data Acquisition Webinars

NEXT SESSION STARTS Aug 17th. All sessions start 8pm Eastern - 7pm Central - 5pm Pacific unless other arrangements have been made.

How it works: Each classes consisting of 5 sessions. Prior to each live session you will receive (via email) handouts to use for notes during the live session. Also, after each live session you will get a link to a recording of that session.

Data Acquisition session 1, Aug 17th.
Data displays; reading & understanding the different ways data can be displayed and placing different signals from the car in the display types.

Data Acquisition session 2, Aug 24th.
Working with data display appearances, manipulating and creating your own displays and creating typical pages/tabs/profiles for your own analysis.

Data Acquisition session 3, Aug 31st
Tips and tricks prior to analyzing your data; math channels (understanding and creating). Understanding data quality, calibrating, sample rates, filtering & noise.

Data Acquisition session 4, Sept 7th.
Using your views to analyze and interpreting the data; first things first, lap/segment times, driver skill & performance and the secret tool of comparing drivers.

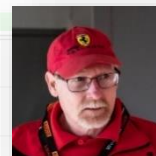
Data Acquisition session 5, Sept 14th.
Part 2, Using your views to analyze and interpreting the data; steady state handling, transient handling, chassis platform movement, and shock absorber performance, tire loading and pre-failure diagnostics.

Next Webinar

Thurs August 13th, 2020

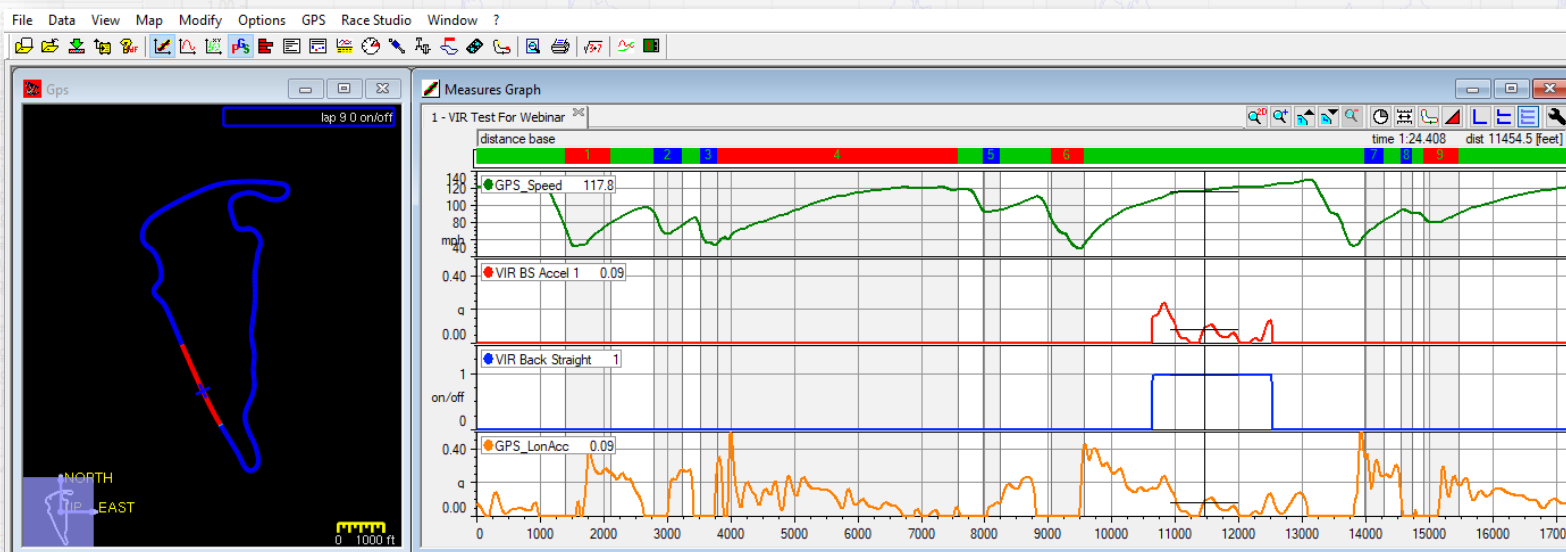
10:00am Pac / 1:00pm East

Precision Driving Analytics
www.precisiondrivinganalytics.com



Co-Host
Ray Phillips

The Power of 'IF' and Other Math Functions in Race Studio



www.aimsports.com

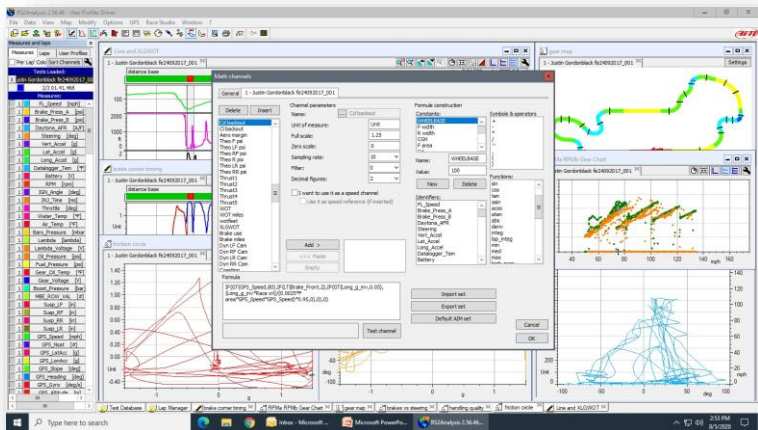


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Next Webinar Topic

The Power of 'IF' and Other Math





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roger@aimsports.com

John Block

john@auto-ware.com
www.auto-ware.com
 (505)-890-8708

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